AD-A179 620 MULTIPURPOSE VISUAL DISPLAY AND EYE MOVEMENT RECORDING SYSTEM(U) NORTHEASTERN UNIV BOSTON MA A A SKAVENSKI 05 FEB 87 AFOSR-TR-87-0533 AFOSR-84-0312 1/1

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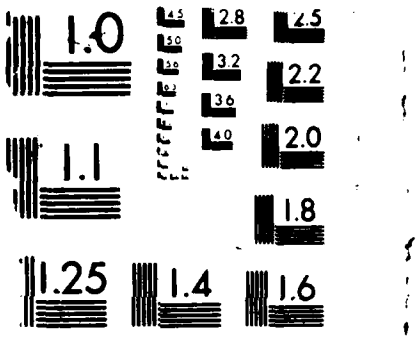

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16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The instrumentation requested to build a complete eye movement recording and visual display facility have been acquired, assembled and it is operational. The facility is centered on a Generation V, SDI Double Purkinje Image Eye Tracker which permits high resolution 2 dimensional eye movement recording in a 20 deg arc field without contacting the human subject's eye. Visual stimulation is produced on a high resolution color monitor which is driven by a video tape recorder or by digitally stored and processed images from the computer. Eye movement data from the tracker are digitized for storage, analysis and plotting by a PDP 11/73 computer. The system is presently operational and we are beginning experimental work. The first experiments involve finding out why an accurate eye position signal is available for localization judgements requiring that the body be pointed at the target but not when judgements are made solely within the visual modality. Details are found in the original proposal.

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~~FINAL PROGRESS REPORT~~

MULTIPURPOSE VISUAL DISPLAY AND EYE MOVEMENT RECORDING SYSTEM
February 5, 1987

The following major items of equipment have been purchased, assembled and are operational:

1. Generation V SRI Purkinje Image Eye Tracker
   Includes: Eye Tracker, Artificial Eye, Optometer, and Visual stimulus Deflector

   Cost: $119,000.00

2. DEC PDP 11/73 Computer System
   Includes: 70 mbyte Winchester hard disk, dual RL02 drives, RX02 drives, VT220 terminal, DMP 40 plotter, Printer and ports

   Cost: $ 24,215.00

3. Computer Interfacing:
   Includes: A/D converter, D/A Converter, Real-Time Clocks, Isolated Parallel I/O port, **Anti-alaising Filters**

   Cost: $ 7,955.00

4. Ikegami Color monitor
   Cost: $ 4,230.00

5. Picture Processing Cards
   Includes: Frame Grabber, 3 Frame Buffers, Pipeline Processor, ITEX Software
   Cost: $ 18,270.00

6. Sony BVU Video tape Recorder
   Includes video camera Cost: $ 23,150.00

7. Touch-input System for monitor
   Cost: $ 1,500.00

8. Tektronix Oscilloscope

   Cost: $ 3,192.00

9. Set-up Costs
   Includes: Travel to SRI for training and inspecting the tracker, Materials for Mounting table, and shipping costs
   Cost: $ 5,604.00
   TOTAL $ 207,156

Project a: Fundamental issues in the control of eye movements (Skavenski)

The foregoing equipment is presently set-up in a large designated

room that was newly renovated by the university as part of their of the software that is used to control the video display and to acquire data from the tracker. We have performed linearity and sensitivity tests on the tracker with human subjects and are developing procedures and hardware to improve these two performance measures. We are also beginning research outlined in projects a and b of our original proposal. Specifically, Skavenski will be examining visual localization accuracy when visible backgrounds provide cues that an object is in a different location than is indicated by signals about the position of the subject's eye in the head. This design is useful in determining if eye position signals are used in localizing under normal viewing conditions: conditions in which Matin and others maintain that localization is based solely on visual cues and not on eye position signals.

Project b: Eye movements and shifts of attention (Reeves)

The study of shifts of visual attention with and without saccadic eye movements (Project b: Reeves) is proceeding as detailed in AFOSR grant 'A model for visual attention' (PI: Reeves). That part of the work requiring high accuracy will be undertaken with the SRI Eye-tracker. Currently, the project is in the development (software) stage.

Project f: Eye movements and the processing of colored contours (Reeves). According to some schemes for obtaining color constancy, color contrast across sharp borders, rather than the color signal in uniform areas, provides the signal for color appearance. Suitable testing of this idea, involving measurement of color appearance of targets with annular and Mondrian-type displays, has already begun in collaboration with L. Arend of the Eye research Institute (Arend and Reeves, JOSA, 1986, 1743-1751). In that work, we found little evidence for color constancy when subjects matched hues of targets in two displays whose illuminants differed. We had tried to control retinal adaptation by requesting the subject to look equally often at the two displays. While earlier work (e.g., Land), which supported automatic color constancy, did not control for retinal adaptation at all, the control provided in the newer work was not particularly good. It is planned to obtain near-stabilization of the adapting pattern for several tens of seconds, thus providing greatly enhanced control of the adaptation conditions, and then remeasure color constancy in the Mondrian situation. This project is also in the software development stage.

Project g: Experiments with cerebral potentials and saccades (Armington). It is expected that this project will provide more knowledge of visual evoked potential waves following saccades, given the precision of the SRI Eye tracker and the ability to condition the evoked response on the exact form of the saccade.

Other projects outlined in the proposal are currently in a hold status because most of the principal people involved in them have left the University and we do not know who their replacements will be.

END

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